

Special Lecture at Kyushu University “Quantum-Proof Complete Cipher Technology” by Takatoshi Nakamura



Date & Time: November 11, 2025, | 13:00 – 14:30 JST

An Inspiring Session: Bridging Academia and Innovation

Cipher-Core Co., Ltd. is proud to highlight that our technology innovator, **Mr. Takatoshi Nakamura**, delivered a special lecture titled “**Quantum-Proof Complete Cipher Technology**” at the Faculty of Information Science & Electrical Engineering, Cybersecurity Center, Kyushu University.

The session brought together PhD scholars, researchers, and technology professionals to explore the emerging frontiers of information security in the quantum era.



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Participants and Collaborators

- **10 PhD and research students** specializing in cryptography, AI, and communication security
- **5 researchers** from the Portable Health Clinic project, engaged in secure telehealth information systems
- **2 business representatives**, including Mr. Hara, exploring collaboration in quantum-proof communication and information-security innovation

Mr. Nakamura's lecture was highly regarded for effectively bridging advanced theory with real-world applications, leaving a strong impression on all participants.

Key Insights from the Lecture

Evolution of AI and Cryptography

Mr. Nakamura traced the evolution of artificial intelligence and information theory, beginning with early foundational research at MIT. He outlined **three major eras of AI development**:

1. **First AI Boom (1950s–1960s):**
A period in which most fundamental theories and concepts of artificial intelligence were created. Two major paradigms—**Symbolism** and **Connectionism**—emerged during this time.
2. **Second AI Boom (1980s–1990s):**
A stage in which many of the theoretical ideas from the first boom were implemented, despite significant limitations in available computing power.
3. **Third AI Boom (2010s–Present):**
An era in which the achievements of the second boom have been dramatically accelerated by overwhelming computational power.

The Imminent Quantum Threat

Mr. Nakamura noted that traditional encryption schemes such as **RSA and AES** are widely expected to be broken by quantum computers within the next decade.

He introduced the concept of “**Store Now, Decrypt Later (SNDL)**” attacks, also known as “**Harvest Now, Decrypt Later (HNDL)**” attacks, and emphasized:

“**Quantum computers will not only break algorithms; they will destroy the trust foundation of the digital society.**”



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Limitations of Current Cybersecurity

Current cybersecurity remains largely **network-centric**, meaning that once a perimeter is breached, internal information becomes fully exposed.

Mr. Nakamura stressed that **true protection must begin with securing the information itself**, not merely fortifying the outer layers of a system.

AI-Driven Information Contamination

Mr. Nakamura warned that the amount of **AI-generated information is increasing at a pace that will soon surpass the total volume of human ever created information**.

As AI systems learn from information produced by other AIs, the **authenticity and accuracy of information steadily deteriorate**.

He cautioned that AI is rapidly acquiring the ability to **fabricate and disguise information security incidents** with sophistication exceeding human deception, making it increasingly difficult to distinguish what is real from what is manipulated.

The Complete Cipher Paradigm

Mr. Nakamura introduced **Complete Cipher**, a **Quantum-Proof, next-generation cryptographic framework** that is proven unbreakable even with *infinite* computational power. He emphasized that meaningful information security does not depend on network or system robustness, but rather on the **information-theoretic security of encryption itself**.

“Even if confidential information is stolen, information encrypted with Complete Cipher is no longer meaningful information.”

Global Context

Mr. Nakamura highlighted that the **United States, Japan, and the European Union** have already begun adopting **post-quantum cryptography (PQC)** standards.

He also cited China’s **JiuZhang-2** quantum-computing system as a clear sign that the quantum-computing era is rapidly approaching.

Path Toward Collaboration

Mr. Nakamura emphasized that the future of information security requires **deep collaboration between academia and industry**.

This lecture opened the path toward a **Joint Research Agreement (JRA)** with Kyushu University and related institutions, focusing on:

- Quantum-proof communication systems
- Countermeasures against AI-driven information contamination
- Secure healthcare information architecture
- Integration of post-quantum cryptographic technologies



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Reflections and Closing Remarks

Prof. Dr. Koichi Sakurai of Kyushu University expressed sincere appreciation for Mr. Nakamura's contribution, noting that the lecture offered **profound insights into the future of Quantum-Proof information security**.

Participants described the session as “**eye-opening**” and “**transformative,**” underscoring its significance for both theoretical research and practical innovation.